Towing the Ships Through Locks at Panama

Forty Electric Locomotives of Unique Design Are Used at the Canal — The Two Channels at Gatun, One for Traffic in Each Direction — Four Locomotives to Tow a Big Vessel — The Working Parts of the Electric Locomotives and Their Operating Characteristics—They Have a Net Weight of 86,300 Pounds and a Gross Shipping Weight of 92,500 Pounds — Are Mounted on Specially Designed Skids When Shipped—How Towing System Was Devised by Electrical and Mechanical Engineer of the Isthmian Canal Commission.

FORTY electric locomotives of unique design are used to tow shipping through the huge locks of the Panama canal. When the canal was being planned it was apparent that the various winch and capstan systems in vogue for towing ships through existing canals and locks would not do for Panama. After a thorough study of the entire problem of maneuvering the ships, it was evident that they could not safely proceed through the locks under their own power, and that a substitute for the ship's power should embrace the following requirements:

Ability to place the ship in proper relation to the locks; capacity for keeping the ship in its course; accelerating and retarding the ship without rupturing the lines; the lines when once attached should be used without change for lockage in flight.

* * *

In passing through the canal from the Atlantic to the Pacific a vessel enters the approach channel in Limon bay, which extends to Gatun, a distance of about seven miles. At Gatun it enters a series of three locks in flight, and is raised eighty-five feet to the level of Gatun lake. It then steams at full speed through the greater part of the channel in this lake, for a distance of twenty-four miles, to Bas Obispo, where it enters the Culebra cut. It passes through this cut, which has a length of nine miles, and reaches Pedro Miguel, where it enters a lock and is lowered thirty feet. Then it passes through Miraflores lake for a distance of one and one-half miles, until it reaches Miraflores, where it is lowered fifty-five feet through two locks to the sea level, after which it passes out into the Pacific ocean through a channel eight and one-half miles long.

The main features of all the lock sites are identical, and the following brief description of the Gatun locks, with special reference to the arrangement of the towing tracks, ship channels, inclines and approaches, gives a clearer conception of the towing scheme in general.

There are two channels at Gatun, one for traffic in each direction. The channels are separated by a center wall, the total length of which is 6,330 feet. There are two systems of tracks, one for towing and the other for the return of the electric locomotives when returning idle. This, however, refers only to the outer walls. For the center wall, there is only one return track in common for both the towing tracks. The towing tracks are naturally placed next to the channel side ,and the system of towing utilizes normally not less than four locomotives running along the lock walls. Two of them are opposite each other in advance of the vessel, and two run opposite each other following the vessel. The number of locomotives is, however, increased when the tonnage of the ship demands it.

* * *

Cables extend from the forward locomotives and connect with the port and starboard sides respectively of the vessel near the bow, and other cables connect the rear locomotives with the port and starboard quarters of the vessel. The lengths of the various cables are adjusted by a special winding drum on the locomotive to place the vessel substantially in mid-channel. When the leading locomotives are started they tow the vessel, while the trailing locomotives follow and keep all the cables taut. By changing the lengths of the rear cables, the vessel can be guided, and to stop the vessel all the locomotives are slowed down and stopped, thus bringing the rear locomotives in action to retard the ship. Therefore, the vessel is always under complete control quite independent of its own power, which is not used, and the danger of injury to the lock walls and gates is consequently greatly lessened.

The towing tracks have a specially designed rack rail extending the entire length of the track between the rails. It is through this rack that the locomotive exerts the traction necessary for propelling large ships and climbing the steep inclines. When the locomotives reaches one of the inclines between the locks, the grade of which may be as much as 44 per cent, or when it is towing a ship, the cog-rail system is utilized to enable the locomotive to climb the grade, and in the other case to exert traction necessary for pulling the ships. The cog or rack rail is laid between the track rails and the locomotive is provided with a cogwheel or rack pinion to engage the rail.

A rack rail is also provided on short portions of the return track, so as to lower the locomotives safely from one level to the next. The steepest slope is 26 degrees, or 44 per cent, hence the need will be seen for rack rail even on the return track, as any traction locomotive with the usual wheel drive, even with the brake set, would begin to slide on a 16 per cent grade, and therefore could not be controlled. With a rack rail, however, traction is limited only by the capacity of the driving motors and not by the adhesion of the wheel treads on the rails.

* * *

Three phase, 220-volt alternating current is used for operating the locomotives, and the current is supplied to the locomotives through an underground contact system. A specially designed contact plow slides between two "T" conductors and transmits the power to the locomotive. This contact plow also passes through the slot opening in the conduit cover and is flexibly connected to the locomotive in such a manner as to follow all irregularities in the tracks and crossovers, and therefore insures a continuous supply of power.

The working parts of the locomotive are supported by two longitudinal upright side frames of cast steel, connected by transverse beams. The locomotive is thus mounted upon four wheels, carried on two axles, the wheelbase being twelve feet and the overall length of the locomotive over thirty-two feet. Each axle is driven by its own motor, independent of the other, and the construction is identical at both ends of the machine. The motor is of the three-phase type, and it is geared by a pinion and spur gear to the countershaft.

The two traction motors are controlled by suitable controllers installed in the cabs at the ends of the locomotives, and the circuits are such that both motors can be controlled from either cab, and can be operated singly or in multiple as desired. Current is taken from the supply conductors by a special current-collecting device.

In connection with each motor a powerful brake is installed, and as during operation the motors are at all times geared either to the axles or to the cog wheels, the truck wheels are not provided with brake rigging. In addition to this automatic brake, means are provided for applying the brakes manually in order to supplement the action of the automatic feature, if necessary, when descending a grade or approaching a rack rail.

* * *

Passing now to the features which render the locomotive peculiarly adapted for towing purposes, it is observed that the drum, on which the towing cable is wound, is located midway between the ends of the locomotive and above the upper member of the side frames, so that the cable can be led off on either side of the machine and through a wide range of angles to the line of travel.

A motor with bevel gear pinion is used for driving the drum at a high speed when coiling the cable that has been cast off, and it remains permanently in gear. Another motor with worm gear drive is used for taking in the cable when it is under load, and the drum operates as a windlass or capstan. The drive is cut out by means of a solenoid operated jaw clutch.

Each of the two main traction motors has a rating of seventy-five horsepower, and is of the slip ring, induction type, operated by a system of contactors with master controller in each cab. The motors, by means of the change in gearing from straight traction to rack rail towing previously described, drive the locomotive at a speed of two miles per hour when towing and five miles per hour when returning idle. These motors act as induction generators running above synchronous speed when the locomotive is passing down the steep inclines, and thereby exert a retarding brake effect to keep the speed uniform.

* * *

The towing locomotives possess the following operating characteristics:

While towing. the speed can be accelerated from zero miles to two miles per hour.

While running idle the speed can be accelerated from zero to five miles per hour, permitting return trips at increased speed.

The windlass will pay out or wind in cable at the low rope speed and at the full twoline pull of 25,000 pounds, when the locomotive is either running or at rest.

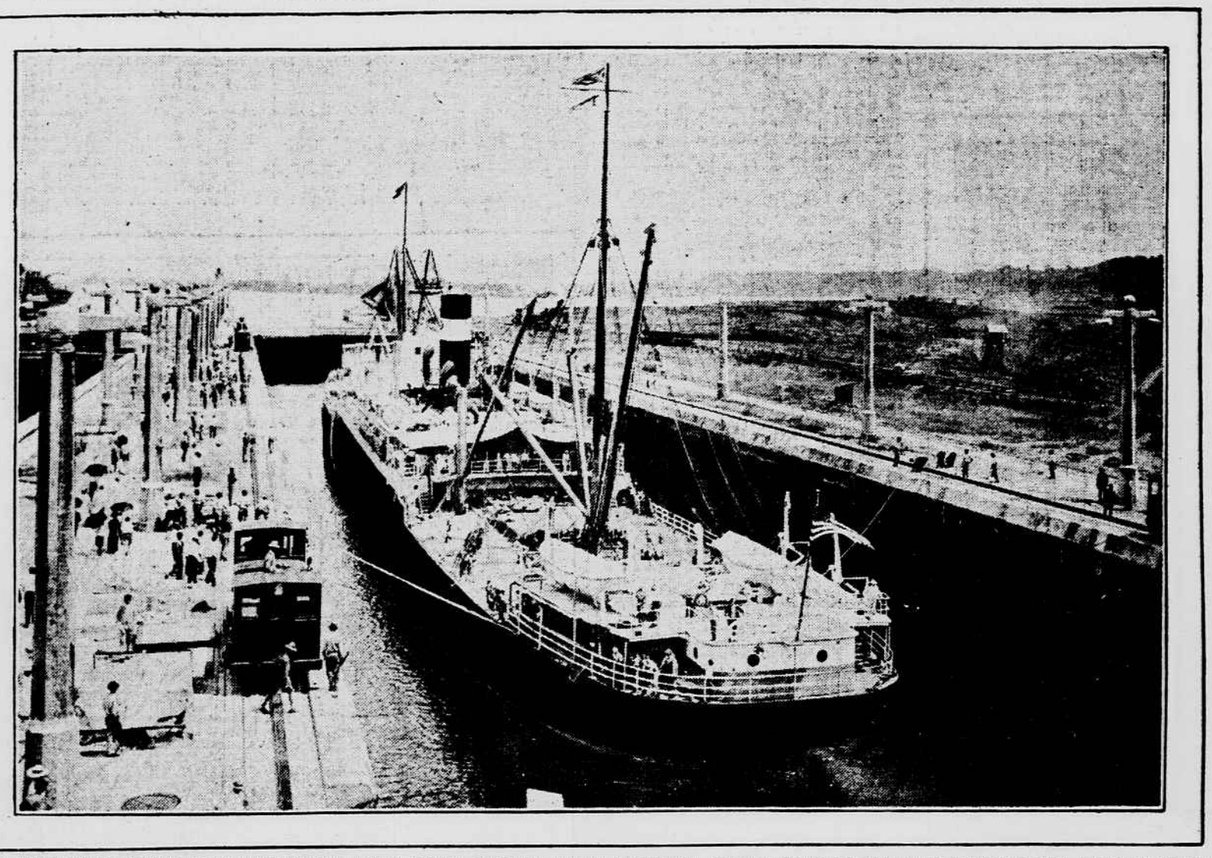
The windlass will pay out or coil in cable at the high rope speed with the towline taut, when the locomotive is either running or at rest.

The windlass is equipped with a safety friction device, which is adjustable for any predetermined value of the towline pull.

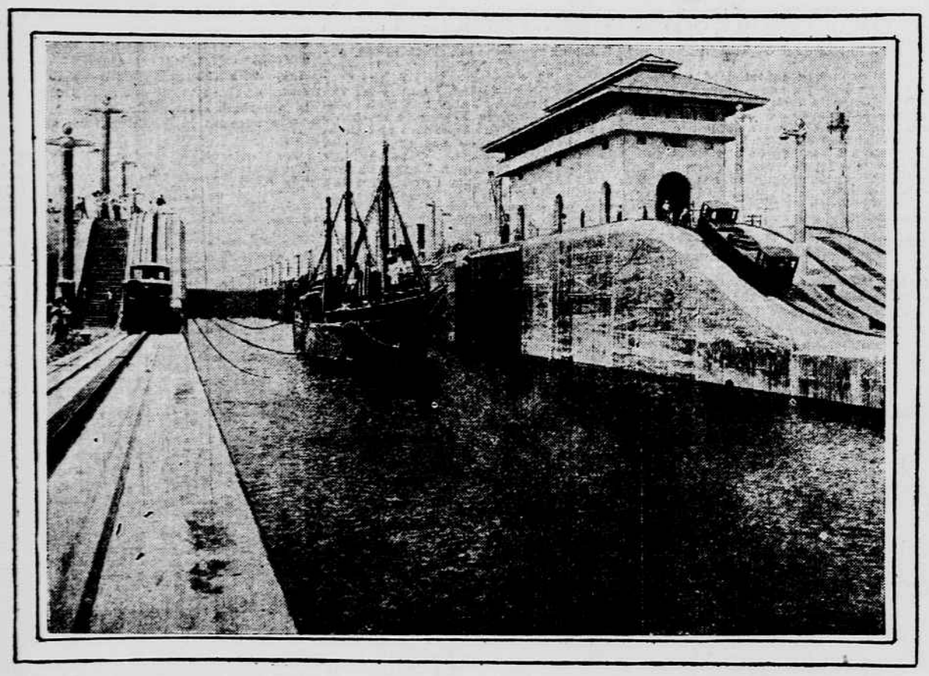
The locomotives have a net weight of 86,300 pounds and a gross slipping weight of 92,500 pounds. They were mounted on specially designed skids and shipped from the Schenectady plant of the General Electric Company by rail to New York, where they were loaded on board the ships as deck cargoes by means of a 125-ton floating derrick.

The towing system was devised and patented by Edward Schildhauer, electrical and mechanical engineer of the isthmian canal commission.

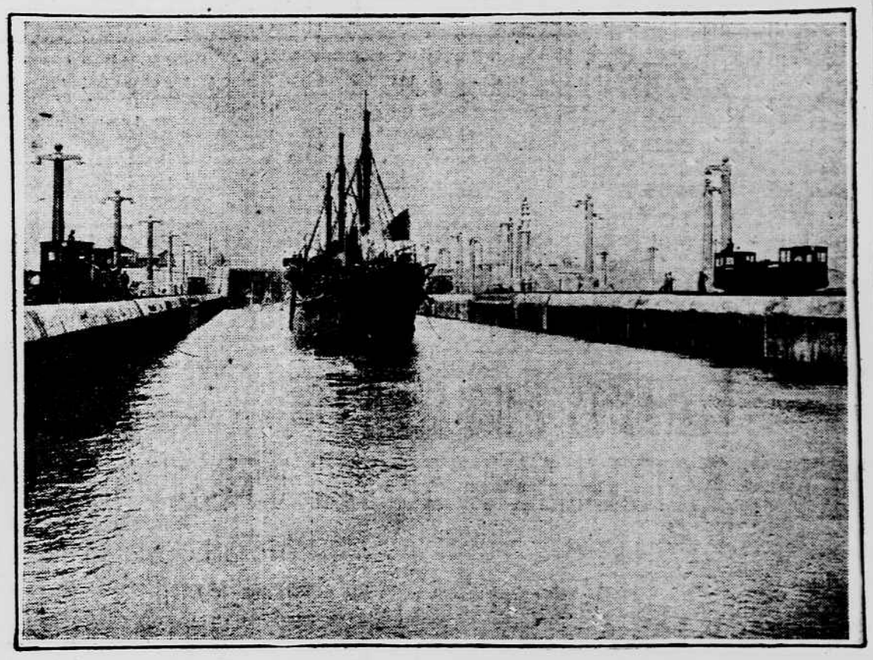
During the first three months of commercial operation of the canal, from August 15 to November 15, the cargo transported through the canal and towed through the locks by the locomotives amounted to 1,079,521 tons. During the fiscal year ending June 30, 1914, the Panama railroad carried 643,178 tons of through freight between the two seaboards and in the preceding fiscal year 594,040 tons. From this it is seen that between six and seven times as much cargo is passing over the isthmus now as passed over this route when goods were transhipped by rail.



THE STEAMSHIP ANCON ENTERING UPPER LOCK FROM MIDDLE WEST CHAMBER UNDER TOW OF ELECTRIC LOCOMOTIVES, LOOKING SOUTH FROM BALCONY OF CONTROL HOUSE.



TENDER SEVERN LEAVING UPPER EAST CHAMBER IN TOW OF ELECTRIC LOCOMOTIVES.



THE TENDER SEVERN AND SUBMARINES IN MIDDLE EAST CHAMBER. FOUR TOWING LOCOMOTIVES ATTACHED TO SEVERN, READY FOR LOWERING WATER.

The Truth.

RICHARD LE GALLIENNE, the poet, was lunching at a fashionable restaurant when a man lounged into the room in a velvet coat, soft black silk shirt, huge windsor tie, sandals and other such-like fripperies.

"Look at that!" laughed Mr. Le Gallienne. "Oh, look at that!"

"Hush," said a magazine editor sternly. "Hush! That's Blank, the famous short story writer. You can't have genius, you know, without eccentricity."

"Perhaps not," said Mr. Le Gallienne, "but, judging from what he writes you can evidently have a deuced big lot of eccentricity without genius."

Offensive Charity.

MAYOR FRANK W. ROCKWELL of Akron said of charity at a charity society's banquet:

"Much depends on the spirit wherein charity is given. It must never be the du haut en bas, the over-haughty spirit. 'To uplift,' as George Ade once beautifully said, 'get underneath.'

"Otherwise the charitable person receives the treatment of the lady who said to a poor washerwoman:

"'And does your husband drink?'

"'No,' answered the washerwoman. 'Does yours?'

"Or of that other lady, a very haughty and sniffing type, to whom another washerwoman remarked, as she wiped her wet hands on her apron to say goodbye:

"'Well, good afternoon, ma'am. I'm sorry I can't return your call. But, the fact is, I never go slummin' myself.'"

THE FERN AS A STATE FLOWER

THE fern has been proposed as the floral emblem of the state of Pennsylvania, and this proposal adds another item to the perplexity of the legislature of the Keystone state over the matter of the adoption of a state flower. When this subject stirred the councils of that state a few years ago the legislature sought to effect a straddle or a politic solution of the trouble by voting that both the daisy and the violet should be established as the floral emblem or emblems of the commonwealth.

This treatment of the question calmed the public conscience for a time, but the peace was not lasting and the advocates of the daisy, the violet, the rose, the goldenrod, the carnation, the corn tassel, the apple blossom and the mountain laurel are agitating anew that legal preference and legislative distinction be meted out to the particular flower which they propose for such honor. The mountain laurel has many and determined supporters, but the opposition makes the argument against its adoption on the ground that the blossom of that shrub or tree has already been adopted as the state floral emblem of Connecticut and one or two other states.

At a late meeting of the American Fern Society at the Academy of Natural Sciences at Philadelphia a distinguished Pennsylvania botanist put forth an argument that the fern should be adopted as the floral emblem of Pennsylvania, saying "that it is preeminently fitted to typify botanically the floral wealth o fthe Keystone state" and "thirty-one states in the Union have already proclaimed floral emblems elected by act of assembly and by other means, but for Pennsylvania the fern is, in my opinion, the fittest floral emblem of all."

It has been submitted that Pennsylvania has added four ferns to the list classified by the great Linnaeus, and that it was these notable ferns that first called the attention of old world botanists to Pennsylvania's remarkable flora. These ferns were Asplenium pinnatifidum and Isoetes ripari, discovered by Thomas Nuttall; Asplenium ebenoides, discovered by R. Robinson Scott, and Nephrodium cristatum X goldicanum, discovered by Ralph C. Benedict, editor of the American Fern Journal.

Missouri is another state which is disturbed by a state flower dispute. The people of Missouri incline toward the adoption of the goldenrod as their floral emblem, which is also the state flower of Alabama, Kentucky, Nebraska and Tennessee, but among Missourians there is a strong sentiment in favor of the adoption of the apple blossom, which, according to one of its prominent advocates, typifies all that is beautiful and useful in life, while its perfume ravishes the senses, its delicate coloring delights the eye, and later in its full fruition it tickles the palate and puts money in the pockets of horticulturists. The goldenrod is being vigorously denounced as a weed, "which does not take up with the ways of civilization," and it is also charged with being guilty of causing hay fever. The apple blossom is the state flower of two states, Arkansas and Michigan.

STERLING HEILIG SAYS ALL EUROPE IS CONSULTING COFFEE GROUNDS

An Effect of the War—The Tiny Wet Particles Are Supposed to Tell of the Future, and Many and Odd Are the Definitions Given to Various Designs in the Bottoms of Cups — Each Design Has a Meaning, Say Those Who Foretell Events of the Future, and They Elaborate to Meet the Demand—And It Is Possible to Make the Coffee Grounds Tell of the Things You Most Desire, for the Cup Can Be Shifted and Turned in Order to Change the Design.

Special Correspondence of The Star.

LAUSANNE, Switzerland, February 1.

THE Austrian baroness in this hotel is on her balcony again.

Carefully she drips her plate of coffee grounds, slowly turning it, at moments, for the millions of tiny wet particles to spread, from figures, and not pile up confusingly. She wants to know if her husband is wounded.

Her husband is in the war. She wants to know if she will get a letter, if he has enough tobacco, if he is victorious, if the money will come from her aunt in Gratz and if she ought to buy that hat.

She goes to church and prays. She has two women cutting and sewing for Hungarian refugees (woolen stuffs are easier bought in Switzerland, but must be sent out as personal baggage, not exported as a commerce). She participates in Red Cross fairs and concerts. She is patient, good, submissive, yet at times she cannot help it; she just must go to the coffee grounds.

How does such a craze get across war barriers?

Women, all over Europe consult coffee grounds.

* * *

On the steppes of Siberia, it is tea grounds; in the French Medoc, it is wine lees; on the Danube, it is wet cornmeal—all more difficult to handle—for the same results.

Professors of the art teach it from house to house, in cities. At Besancon, it is a hospital amusement. At Leipzig, officers' wives have coffee grounds afternoons. Handbooks appear on the stands. The newspapers are full of coffee grounds' editorials saying: "Without consulting coffee grounds, we see no immediate solution," etc.

Coffee grounds mean dread, hope, patience, agony of heart and even prayer of poor mortals under unusual and universal strain. Europe is an anxious place.

You take two or three large pinches of very fine, dry coffee grounds. Throw them into a littl cup, dilute them with a little water and pour it all on a flat, clean plate. Bend over and blow on it in every direction, to spread the diluted grounds all over the plate. Leave them repose a short time. Then drip the excess of liquid off with great care.

As the excess of liquid drips off it form channels in the thicker grounds which stick to the plate, and these, spreading and separating as the plate is turned and dripped, form figures, which one seems to recognize as crooked lines, straight lines, birds' heads, houses, boats, etc. The whole art is in blowing, dripping and spreading so that the grounds shall not pile up and become confusing.

* * *

Sometimes the figures are numerous. Often they are rare. All insufficient and doubtful figures should be rejected and not counted.

Human heads are more frequent than you might think. When simply round, without a drip line, they are excellent meaning a new acquaintance who will have good influence on your life or affairs. If a drip line hangs downward, like the beginning of a neck, an existing acquaintance is proclaimed to be lightweight, doing you rather harm than good. But if the drip line sticks upward, like the beginning of a cap or hump, it is a well known friend, serious, good, always ready to render service—make a call or send a post card.

The Greek boy at Lausanne University, whose father pays his board direct, was hard up and resorted to coffee grounds. A human head with a night cap gave him courage to strike the old Greek general, at his hotel, who is rich, blind and doesn't need to spend much on himself. The operation was successful. I just mention it.

Quadrupeds are of problematical value. They may be only animals' heads, or head, shoulders and a couple of legs. All indicate a change of situation.

Houses may often be mistaken for other figures.

"I never count a house," says the baroness, "unless the roof be formed, and there must be an appearance of windows."

Recently she got a roof without windows, and windows without a roof. She was all upset, because houses are just her sign; it means happy in family, end of separations or beginnings of reconciliations.

* * *

The Evansville banker's young daughters have dripped boats frequently. They know that their father is crossing the Atlantic to visit them, but the question is, will he take them back home? They have had their fill of European boarding schools. Now, is it permissible to shake the plate while dripping it when you see a boat coming with only one mast? Two masts mean an ocean voyage; one mast, any old trip.

"Shake it, Jane!" says Dorothy.

Do not mistake a boat for a fish. If the fish be really well formed, it need not have eye or mouth; but a fish's head alone must have both. Otherwise reject it. Fish mean false or temporary happiness, when isolated. Two or more fish together signify disappointment.

Of course, every one wants birds. Ah, light birds, messengers of love! Even a cuck's head.

"Give me my letters, James," exclaims the Polish countess. "What, none? Then they'll come tomorrow, for my birds have wings."

James undestands. A duck's head means a post card, and half the war correspondence is on post cards, to facilitate quick passage through the censorship. The more complete the bird, the better the news.

Now, there is a young Brazilian widow in the hotel who simply gives herself up to good works. She did not intend to. She expected to have a good time in Paris, but Paris was sad, and she fled. Beautiful, healthy, pleasure-loving creature, with plenty of money, she was lost in Europe. At Lausanne the idea came to her—she would work for refugees of both sides. (The convalescent Hungarian with velvet eyes says she ought to, and she really promised the French lieutenant at Pontarlier). She employs five women, keeps three sewing machines going, and a confidential messenger to take the sacks of women's and girls' garments and underwear, and socks, stockings, underwear, flannels, etc., for both sexes to the French and Austrian frontiers, both close at hand.

* * *

"Is it right to consult coffee grounds?" she asks, grown suddenly serious.

"Yes," replies a good and venerable man, "on condition that you don't believe them."

Then, in a wise theory, he elucidates the remarkable fact that their fortunes always come out true!

"People who consult coffee grounds," he says, "watch their ways, doings and happenings. Ordinarily people go helter-skelter, and remember nothing. We seek for a sign because we are worried by danger to dear ones, and troubled by compromised incomes, bad business and all the procession of boredoms, disappointments and sudden changes following on the tragical events of Europe. If our coffee grounds make circles, a sure sign of money, we wait with better patience, and when money comes—as it always does, but never enough—we remember that the coffee grounds told true."

"Yes," says the bereaved bride, with tear-stained cheeks, "but how about long, straight lines cut across by short ones. They signify sickness in proportion to the number of steps, the more the sicker."

The good man sighs.

"Sickness comes, too. Be glad of a reminder to take precautions."

So, if you drip a tripod, like a three-legged stool, or comb with three teeth, you will triumph over the machinations of an enemy. Now, most women who are worth anything have enemies. Assured in advance of triumph, one has calm confidence to be gracious, and heap coals of fire on their heads.

* * *

And, so, if you find a crooked line warning you that your enterprise will fail, your hope be deceived, and ruin, perhaps, will stare you in the face, all right—take measures to frustrate it.

Because, you know, you can avoid the bad fortunes.

I neglected to mention it, but this is the fascinating part of coffee grounds. All depends on where the signs are, on the plate.

In your mind's eye, when you read the figures, draw a horizontal line, an equator, across the center of the plate. Agrippa von Nettesheim, in the fourteenth century, called it "the level of the righteous."

Agrippa von Nettesheim consulted wine-lees, in his day, coffee being then unknown in Europe, but he was a grand old expert in essentials.

"All the figures which appear in the upper or northern half of the plate, above the level of the righteous, have far greater power for good and lesser power for ill than those appearing beneath it," says Agrippa. "Their fulfilmnets may be modified, increased or avoided by prudence and virtue of the consultant."

And, again, in your mind, draw a vertical diameter straight up and down the center of the plate. Agrippa von Nettesheim called it "the mystery." All the figures found in the right hand or eastern section take a favorable tendency, while those on the left hand are unpropitious.

* * *

Observe how it worked with the Austrian baroness.

She found a serpent below the level of the righteous, a sure sign of being calumniated by a jealous person, with danger of its being believed. Beside it was a star or flower, which signifies the beloved person, in the western or left-hand section, which is squarely unfavorable. And, below, there was a chain denoting family complications, south of the equator—that is, in a bad sense.

The baroness was all upset again.

She sent regrets to the bridge, countermanded that hat (not the one I mentioned, but another), and stayed indoors all day, sewing with her women.

Yet, that evening, she showed up at the bridge, radiant.

"What is?" I whispered.

"My mistake," she gurgled. "All so silly! (She speaks English-English) I was looking at it up-side-down!"

And the child spoke true.

She proved it to me later. Shifting the plate round, just a quarter turn, the serpent came above the level of the righteous, and the jealous party thereby became negligible. The flower or star of the beloved shone in the favorable right-hand hemisphere. And as for family complication——

"As for family complications," she cooed, "they are honey, thank you, north of the equator!"

Which is the beauty of coffee grounds. Which is north? Which is south? Which is east? Which is west? Which is up? Which is down? Which is right? Which is left?

The three fates of Paris—Lucille Western, Gaby Desbrosses and Marcella Bloch—have spoken. They are three popular hospital nurses who have, probably, most whiled away tedious hours for the suffering by means of coffee grounds.

"It is intuition," says Lucille.

"It is inspiration," says Gaby.

"It is induction," says Marcella, "or else introspection."

All agree with Andre de Taverny, the astonishing young Hebrew kabbalist of Paris, who says the guiding star is faith and love.

When in doubt, turn the plate.

STERLING HEILIG.

THE THREE FATES OF PARIS.

Lucile Western, Gaby Desbrosses and Marcella Bloch, popular hospital nurses, who have whiled away tedious hours for the suffering by means of coffee grounds.

CAPITAL PUNISHMENT IN THE UNITED STATES

AGITATION against capital punishment is being carried on in certain Influential quarters in the state of New York, and the abolition of capital punishment and the making of life imprisonment the maximum penalty for any crime is the object of a bill introduced in the assembly by John J. Ryan, representative from the first New York district. Much of the opposition to the proposed change finds its reason in the danger of the pardoning power, which might finally set free prisoners convicted of capital crimes.

In seven states life imprisonment is the maximum penalty. Those states are Kansas, Maine, Michigan, Minnesota, Rhode Island, Washington and Wisconsin. Capital punishment is executed in the form of electrocution in Arkansas, Indiana, Kentucky, Massachusetts, Nebraska, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina and Virginia.

In two states, Nevada and Utah, death is by hanging or shooting, at the discretion or will of the condemned person, and the hangman, noose and trap deal death in the District of Columbia, Colorado, Connecticut, Alaska, Arizona, California, Alabama, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Louisiana, Maryland, Mississippi, Missouri, Montana, New Hampshire, North Dakota, Oklahoma, Oregon, Porto Rico, South Dakota, Tennessee, Texas, Vermont, West Virginia and Wyoming.